INDICATIONS OF ROOT CANAL TREATMENT FOR PATIENTS VISITING TERTIARY CARE HOSPITAL: A HOSPITAL-BASED PROSPECTIVE STUDY

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ABSTRACT

INTRODUCTION

Root Canal Treatment (RCT) when an irreversibly damaged or necrotic pulp with or without clinical and/or radiological findings of apical periodontitis occur. Apart from these there are various other reasons in which RCT is performed. There is paucity of literature revealing diseases requiring RCT and what are the presenting symptoms for patients requiring it. Hence, this study is conducted to overview the factors for it.

MATERIAL AND METHODS

Among 594 patients, 510 were included in the study. The survey form included patient specific characteristics such as: age, gender, tooth number and pain; tooth specific characteristic included swelling, previous root canal treatment, complain tooth characteristic, diagnosis and tooth wear. These data were matched with the respective radiograph and history form sheet. Two observers participated in collection of data in the study. Inter-observer agreement was tested with Cronbach's alpha which was 0.79. The data were collected in a spreadsheet and simple descriptive statistical analysis was performed using SPSS software version 22 to get the results in percentages and frequencies.

RESULTS

54.1% of female patients had undergone RCT and 75.7% of patients presented with pain. The most common treated tooth was first molar. The most common pulpal diagnosis was symptomatic irreversible pulpitis (36.08%, n=184) followed by pulp necrosis (30.20%, n=154) and previously treated (17.25%, n=88). The most common periapical diagnosis was symptomatic apical periodontitis (62.94%, n=321).

CONCLUSION

Subjective symptoms were the most common factor for seeking treatment. Hence, a greater number of awareness campaign are required to acknowledge asymptomatic cases too.

KEYWORDS

Diagnosis, Patients, Root canal treatment

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INTRODUCTION

European Society of Endodontology specifies indications of Root Canal Treatment (RCT) when an irreversibly damaged or necrotic pulp with or without clinical and/or radiological findings of apical periodontitis occur. Also, elective devitalization can be done to provide post space, before construction of an overdenture, doubtful pulp health prior to restorative procedures, likelihood of pulpal exposure when restoring a (misaligned) tooth.[1]

In most of the cases, RCT is performed as a consequence of symptoms such as pain, tenderness and swelling. Some asymptomatic deep carious exposures might also require RCT before the signs develops. On the regular basis retreatment of previously treated cases is also performed. Apart from that, patient may also require intentional RCT before prosthetic rehabilitation.

The most common reason and indications for recent RCT, as performed in hospital-based settings, are not well known. There is paucity of literature on most likely indication for RCT. Hence, the study aimed to assess the most common reason for the root canal procedure.

MATERIAL AND METHODS

This descriptive cross-sectional study was carried out from March, 2020 to March, 2021 on the patients visiting the out-patient department of Conservative Dentistry and Endodontics at Universal College of Medical Sciences, Bhairahawa, Nepal with an approval from Institutional Review Committee of Universal college of Medical Sciences (UCMS/IRC/019/20). The patients who decided to participate gave their signed and informed consent. The investigation included 510 samples in total. The inclusion criteria for the patients was done fulfilling the requirements with age ≥ 18 years, starting root canal treatment during the designated study period and capable of independently giving voluntary informed consent. The exclusion criteria were for those patients who refused or unable to give consent like mentally retarded or physically disabled patients, patient who had difficulty in reading and understanding Nepali, Hindi or English languages and patients below 18 years. The calculation of sample size was done as follows:

Sample size (n) = Z2 × p × q / e2 = (1.96)2 × 0.5 × (1-0.5) / (0.05)2 = 384.16
where, Z= 1.96 at 95% Confidence Interval, p=50% assumed prevalence of root canal treatment=0.5
q= 1-p , e= 0.05 (5% margin of error)

The minimum sample size was 385. Keeping 10% non-responsive rate the total sample size determined was 424. However, all the patients requiring RCT, during the designated study period were included in the study.

A flow chart of the recruitment procedure is presented in Fig. 1.

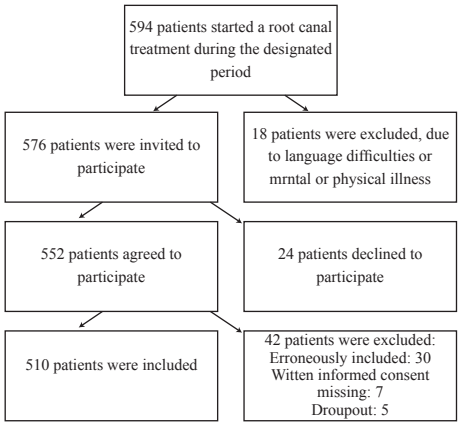

Figure 1. Recruitment procedure

The survey form included patient specific characteristics such as: age, gender, tooth number and pain; tooth specific characteristic included swelling, previous root canal treatment, complain tooth characteristic, diagnosis and tooth wear. These data were matched with the respective radiograph and history form sheet. Two observers participated in collection of data in the study. Inter-observer agreement was tested with Cronbach's alpha which was 0.79. The data were collected in a spreadsheet and simple descriptive statistical analysis was performed using SPSS software version 22 to get the results in percentages and frequencies.

RESULTS

Five hundred and ten patients met the inclusion criteria, out of total 234 (45.9%) were male and 276 (54.1%) were female. The gender and pain distribution are given in figures 1 and 2 respectively

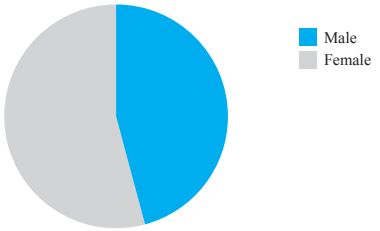

Figure 2. Gender distribution (n=510)

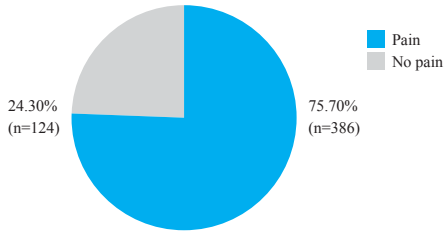

Figure 3. Pain distribution (n=510)

The distribution of symptoms are depicted in table 1. Extra oral swelling was present in 22 (4.3% cases) and intra oral swelling was present in 26 (5.1%) cases. Sinus tract was present in 28 (5.5%) cases.

Table 1. Distribution of symptoms

	Swelling				Sinus tract	
	Extra-oral		Intraoral			
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Absent	488	95.7	484	94.9	482	94.5
Present	22	4.3	26	5.1	28	5.5
Total	510	100.0	510	100.0	510	100.0

The distribution of treated teeth according to arch are given in table 2. The most common treated tooth was first molar. In the maxillary arch its frequency was 5.5% (n=28) for right side and 4.3% (n=22) for left side. Similarly, in the mandibular arch, its frequency was 12.5% (n=64) for left side and 10.6% (n=54) for right side.

Table 2. Distribution of treated teeth according to arch

Maxillary arch			Mandibular arch		
Complain tooth	Frequency	Percent	Complain tooth	Frequency	Percent
11	26	5.1	31	8	1.6
12	12	2.4	32	4	.8
13	-	-	33	2	.4
14	16	3.1	34	4	.8
15	12	2.4	35	24	4.7
16	28	5.5	36	64	12.5
17	20	3.9	37	46	9.0
18	4	.8	38	14	2.7
21	20	3.9	41	4	.8
22	12	2.4	42	2	.4
23	6	1.2	43	4	.8
24	4	.8	44	14	2.7
25	2	.4	45	12	2.4
26	22	4.3	46	54	10.6
27	22	4.3	47	32	6.3
28	2	.4	48	14	2.7

The most common pulpal diagnosis was symptomatic irreversible pulpitis (36.08%, n=184) followed by pulp necrosis (30.20%, n=154) and previously treated (17.25%, n=88) as shown in table 3.

Table 3. Distribution of treated teeth according the pulpal diagnosis

Pulpal Diagnosis	Frequency	Percent
Normal Pulp	26	5.10
Symptomatic Irreversible Pulpitis	184	36.08
Asymptomatic Irreversible Pulpitis	32	6.27
Pulp Necrosis	154	30.20
Previously Treated	88	17.25
Previously Initiated	26	5.10
Total	510	100.0
Pulpal Diagnosis	**Frequency**	**Percent**
Normal Periapical Tissues	96	18.82
Symptomatic Apical Periodontitis	321	62.94
Asymptomatic Apical Periodontitis	43	8.43
Acute Apical abscess	22	4.31
Chronic Apical Abscess	28	5.49
Total	510	100.0

The most common periapical diagnosis was symptomatic apical periodontitis (62.94%, n=321) as shown in table 4.

Table 4. Distribution of treated teeth according the periapical diagnosis

	Frequency	Percent
Normal Pulp, Normal Apical Tissue	26	5.10
Symptomatic Irreversible Pulpitis, Normal Apical Tissue	38	7.45
Symptomatic Irreversible Pulpitis, Symptomatic Apical Periodontitis	146	28.63
Asymptomatic Irreversible Pulpitis, Normal Apical Tissue	32	6.27
Pulp Necrosis, Symptomatic Apical Periodontitis	101	19.80
Pulp Necrosis, Asymptomatic Apical Periodontitis	23	4.51
Pulp Necrosis, Acute Apical abscess	10	1.96
Pulp Necrosis, Chronic Apical Abscess	20	3.92
Previously Treated, Symptomatic Apical Periodontitis	58	11.37
Previously Treated, Asymptomatic Apical Periodontitis	15	2.94
Previously Treated, Acute Apical abscess	9	1.76
Previously Treated, Chronic Apical Abscess	6	1.18
Previously Initiated, Symptomatic Apical Periodontitis	16	3.14
Previously Initiated, Asymptomatic Apical Periodontitis	5	0.98
Previously Initiated, Acute Apical abscess	3	0.59
Previously Initiated, Chronic Apical Abscess	2	0.39
Total	510	100

DISCUSSION

It is estimated that oral diseases affect nearly 3.5 billion people representing the burden of untreated dental caries, severe periodontitis, and edentulism worldwide. Kassebaum et al reported that untreated dental caries (tooth decay) in permanent teeth is the most prevalent health condition, affecting 2.5 billion people globally.[2]

If left untreated the disease may progress into advanced stages involving pulp and causing dental sepsis which may be more jeopardous than the lesion itself requiring endodontic and surgical treatment.[3]

As part of dentistry's main goal to maintain a healthy, natural dentition for the public, the endodontic treatment aims to preserve functional teeth without prejudice to the patient's health. One of the scope of endodontics is pulpectomy followed by Root Canal Treatment (RCT), carried out when the pulp is irreversibly inflammed. RCT aims to preserve the normal periradicular tissues when the pulp is diseased or injured and to restore periradicular tissues health when apical periodontitis develop.[1] In treated cases, retreatment may be required in inadequate root canal filling with radiological findings of persisting or post-treatment apical periodontitis and symptoms.

Sometimes, intentional (elective) RCT of teeth with normal pulps may become necessary.[4] American guidelines for clinical endodontics outlines the need for intentional RCT in clinical situation where teeth with a pulp that would be compromised during dental procedures, including but not limited to, caries removal, over denture abutments, malposed teeth and root resection and restorative reason when a placement of a core or possibly a post is necessary for retention of a fixed restoration.[5]

The result of the study showed that, among 510 patients, 234 were male (45.9%) and 276 were female (54.1%), with a male to female ratio of 1:1.2. This figure is similar to the study conducted by Umanah AU et al.[6] which reported 93

(43.7%) males and 120 (56.3%) females. Also, the study by Hollanda AC et al[7] and Ibhawoh LO[8] showed higher prevalence of teeth with root fillings for females than males. Among 510 patients, 386 (75.7%) presented with pain while 124 (24.3%) presented without pain. Root canal treatment was most often performed to alleviate symptoms such as pain and tenderness caused by symptomatic irreversible pulpitis, symptomatic apical periodontitis and acute apical abscess. Asymptomatic pathological processes like irreversible pulpitis, pulpal necrosis, asymptomatic apical periodontitis and chronic apical abscess were diagnosed during routine dental examination, and treatment was instituted in these teeth more rarely. Pain was the most common symptom (89.6%) in a study conducted in Nigerian tertiary hospital.[8] Reit et al., also reported 58% of all teeth in which root canal treatment was initiated were symptomatic.[9]

Tissue swelling, at the time of initial emergency visit, is associated with an acute periapical abscess. Swelling may be localized if it is confined within the oral cavity whereas, it may be diffuse if it extensive and spreads through adjacent soft tissues, dissecting tissues spaces along fascial planes.[10,11] Intraoral swelling was present in 26 (5.1%) patients and extraoral swelling was present in 22 (4.3%) patient. Chronic periapical abscess typically presents with no discomfort and an intermittent discharge of pus through an associated sinus tract. Sinus tract was present in 28 (5.5%) patients.

The current study's most common diagnosis was symptomatic apical periodontitis (62.94%). This was followed by symptomatic irreversible pulpitis (36.08%), pulp necrosis (30.20%) & previously treated (17.25%). The study done by Wigsten et al. reported that the most common diagnosis was pulpal necrosis with apical periodontitis (38.1%), followed by pulpitis (37.7%). Similarly, most prevalent diagnosis was acute apical periodontitis (48.2%) according to Ibhawoh LO.[8] In contrast, Bjorndal et al[12] reported pulpitis (52%) as the dominating condition.

There is a large pool of potential retreatment cases done in our department. 88 out of 510 (17.25%) were presented with sub-standard root fillings requiring re-RCT. This high frequency of failures could have resulted from the treatment done by dental technician or dental hygienist, or even a quack. Quacks are those who have observed and self-learned a few dentistry techniques either by assisting dental surgeons or inherited it from their families and adopted it as a profession.[13]

In many developing countries like ours, where oral health facility and qualified dental personnel is limited, quackery is common. Many dental quacks are practicing illegally and making money by doing unethical practice which hampers patient's oral health. So, we can't deny the fact that retreatment is standard.

In 2008, the American Association of Endodontists held a consensus conference to standardize diagnostic terms used in endodontics. A complete endodontic diagnosis must include both a pulpal and a periapical diagnosis for each tooth evaluated. In accordance, this study attempts to give the frequency of indications for RCT with combined diagnosis. Symptomatic irreversible pulpitis; symptomatic apical periodontitis (146, 28.63%) was the most commonly indicated entity for RCT followed by pulp necrosis; symptomatic apical periodontitis (101, 19.80%) and previously treated; symptomatic apical periodontitis (58, 11.37%).

Elective RCT was done in 26 (5.10%) cases with presumed doubtful pulps, scheduled for prosthetic procedures like abutments for fixed partial denture, overdentures, etc. Analysis of the disease pattern undergoing root canal treatment surely enlightens the treatment procedure itself. .These data will not only have impact of awareness to dental practioners but also for the patients.

CONCLUSION

Within the limitation of the study it can be concluded that, root canal treatment is found generally done for symptomatic irreversible pulpitis cases. Symptoms seems to be driving factor for seeking consultation. Hence more aggressive educational campaign for routine general dental checkup is required for preventive treatment.

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CONFLICT OF INTEREST

None

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